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Women have more Sex than Men

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WOMEN HAVE MORE SEX THAN MEN

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ABSTRACT: Surveys usually confirm the popular notion that men have more sex than women. This paper proves the opposite, at least if the measure is taken to be the average number of unique partners of the opposite sex over a lifetime. The reason for this is basically that more men are born than women, and both sexes share the same sexual encounters. The paper also includes some speculation about why it should be that so many people believe something that can't be true.

KEYWORDS: Median, Mean, Census

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1. BACKGROUND.

One June 28, 2007, Fryar, et. al. released a report that included the summary statement that "The median number of lifetime female sexual partners for men was seven and the median number of lifetime male sexual partners for women was four." On August 12, 2007, Kolata reported this result in the New York Times, along with commentary that similar inequalities have been found in other surveys. Kolata's article also included a claim by mathematician David Gale that the inequality is impossible, since there is a sense in which women have to have the same amount of sex as men. The current paper is a continuation where we prove that the inequality should actually be reversed.

We intend to compare statistical means, rather than medians, since our method of proof does not apply to medians. To be precise, we wish to compare the mean number of distinct partners of the opposite sex experienced by males (*M*) and females (*W*) over their lifetimes. The same data (CDC, 2007) that support the introductory quote about medians also support the statement that *M*= 23.4 and *W*=7.0 (the data are very skewed, hence the large differences between means and medians). Our contention is that *M* has to be smaller than *W*.

We emphasize that our conclusions depend on only one physical fact: there are more men born than women. Given that fact, no assumptions about the sexual habits of either men or women are needed, nor can any be conclusions about those habits be made from the truth of our title.

2. THE PROM THEOREM.

Like Gale, we make an analogy to a high school prom. A dance is a good starting point, since we know when it starts, we know when it ends, and it is very unlikely that anybody will die in the meantime. So suppose there is a prom, and that a chaperone wants to find the average number of girls that a boy dances with (call it *M*) and likewise the average number of boys that a girl dances with (call it *W*). Suppose two boys and one girl attend the prom. If both boys dance with the girl, then *M*=1 and *W*=2. If only one boy dances with the girl, then *M*=0.5 and *W*=1. If nobody dances, then *M*=0 and *W*=0. There are no other cases, so in no case is *M* greater than *W*. Why is this?

In general, let *B* be the number of boys at the prom and *G* the number of girls. Also let *U* be the number of unique pairings of boys dancing with girls (*U* is 2, 1, and 0 in the three examples above), and note that the words "boys" and "girls" could just as well be interchanged in the definition of *U*; if a boy dances with a certain girl for the first time, then that girl is also dancing with the boy for the first time. This basic symmetry is essentially Gale's observation, and it would follow that *M*=*W* if there were the same number of boys as girls at the dance. The general formulas for *M* and *W* turn out to be *M*=*U*/*B* and *W*=*U*/*G*, as will be shown in the next section. Thus, regardless of who dances with whom, as long as 0/0 can be interpreted favorably, the ratio *W*/*M* is always *B*/*G*. To find *W*/*M*, we don't need to measure U or pay attention to the dancing in any way, but only measure the number of boys and girls that attend the prom.

We will now show that the formulas for M and W are correct. Let M_i *be the number of unique girls that the* i^{th} boy dances with, and let W_j be the number of unique boys that the j^{th} girl dances with. Then, by definition, the average number of unique girls danced with by a boy is $(M_1 + M_2 +...+ M_B) / B$, and the average number of unique boys danced with by a girl is $(W_1 + W_2 +...+ W_G) / G$. But the two sums are both equal to U, the total number of unique couples dancing. The proof of this is essentially the observation that summation is associative — it is simply a matter of partitioning U in two different ways. Every time a girl and a boy dance for the first time, the M-sum is incremented by one because one of those boys has just danced with a girl, and likewise for the W-sum. Both sums are equal to U, the total number of unique couples that dance.

3. APPLICATION TO SEX.

Our object in this section is to apply the prom theorem to having sex. We assume that "having sex with" is well defined and symmetric, just like dancing at the prom. One of the reasons why survey results conflict with theory may be that this assumption is faulty — Bill may feel that he has had sex with Monica, for example, while Monica doesn't feel the same way about it. We nonetheless assume symmetry. We also assume that there are only two possibilities for a human, to be either male or female when born. Regardless of sexual preferences or subsequent sex changes, we take the gender of any individual to be as when born. Any sex within a gender is simply ignored — we count only heterosexual couplings. Let M_i and W_j be the number of lifetime partners of the opposite sex for the i^{th} man and the j^{th} woman.

The prom analogy is best if we include all humans as subjects, since this eliminates the possibility of someone having sex with someone else who is not a subject. Therefore, in spite of the impracticality, let's imagine including all humans who have ever lived or ever will live as subjects. This catholic viewpoint will lead us to including many humans who have had no sexual partners at all when they die, as well as a few who have had very many. If man number 3 dies at age 2, for example, then M_3=0. If we include all humans in our complete survey, regardless of the age at death, then, when the books are finally closed on the human race, we will have a perfect analogy to the prom. The ultimate ratio W/M will be the same as the ratio of the number of men who have ever lived to the number of women who have ever lived. If current trends continue, this ratio will be approximately 1.05, since that is the ratio of male to female births. In any case, the truth of falsity of our title depends only on this ratio.

The situation is a bit more complicated if we want to average over some finite time period. Suppose we take our subjects to be all people who die in that period. There may have been sex between subjects and other humans who are not subjects on account of outliving the period. In the prom analogy where U=1, suppose that the boy who dances turns out not to be a subject, so that the population consists of one boy and one girl. In that case we would find M=0 (the only boy in the population doesn't dance) and W=1 (the girl still danced with somebody), which is confusing. If instead the girl is not a subject, then W is not even defined. In spite of these difficulties over short periods, there is no *essential* complication to our argument as long as the period is long compared to a human lifetime — almost everyone who has sex with a subject will also have died, and therefore also be a subject. Over a long period of time where more men than women enter the population, we will still find $W>M$.

Women live longer than men, to the extent that women outnumber men in the population in spite of the larger male birth rate. Might there be some circumstance where "mature" men have more sex than "mature" women, even though more men are born than women? Certainly there is. We might, for example, define "mature" to mean "over 30", and imagine a world where women only have sex when under 30, and always die of it immediately. A survey of mature women will find only women who have never had sex and never will, whereas the same may not be true of mature men because some of them have had sex, albeit not with mature women. As long as we count sex between mature and immature individuals, this kind of example will always be possible because the immature individuals are not themselves subjects, and the prom theorem need not apply. The theorem still applies, however, if we count only sex between mature individuals. When someone dies, we ignore the event if his or her age is less than the maturity age t, or otherwise include him or her as a subject. The score for that subject may not be known for another t years, since it may not yet be clear whether some of the subject's partners are themselves subjects, but is nonetheless well defined. If we define W_t and M_t to be the average scores of mature women and men, respectively, we will find $W_t > M_t$ if and only if the rate at which mature men enter the population is greater than the rate at which mature women enter the population. This rate of entry is simply the population in year group t. According to the US census (Census, 2007), the smallest year group for which women outnumber men is 36, so the "maturity" age at which women and men have the same amount of mature sex over the rest of their lives is about 35. Conventional definitions of sexual maturity are well below age 35, and so, barring examples of the type that began this paragraph, the conclusion that women have more sex than men persists.

4. WHY THE CONFLICT?

We have argued above that the ratio *W/M* should be about 1.05, the same as the ratio of male births to female births. Surveys, on the other hand, usually verify the popular notion that men have more sex than women. Here are some possible explanations for the conflict:

1. The survey responses might not be accurate – perhaps men brag about sex, whereas women don't.

2. As mentioned earlier, "having sex" might mean different things to men and women. Men may count some incidents that women don't.

3. The surveyed subjects might not be a random sample. For example, they might not include prostitutes, and they certainly don't include young children.

4. The surveys are not exit interviews. Instead of sex over a complete lifetime, subjects report only sex so far.

5. If the statistics for women were more skewed than for men, as they might be if a significant fraction of sex involved high-scoring female prostitutes, then the median ranking might reverse the mean ranking, thus preserving intuition. However, the CDC data (CDC, 2007) do not encourage this explanation. The largest score (9000) out of about 5,000 subjects is held by a 38 year old male, and the next largest score (1500) is also held by a male. On account of these large male scores, the mean scores mentioned in the introduction show an even greater disparity than the medians.

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